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09/863,128	05/22/2001	F. Patrick Doty	SD-8286	9592

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EXAMINER	
STOCK JR, GORDON J	
ART UNIT	**PAPER NUMBER**
2877	

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/863,128	DOTY ET AL.	
	Examiner	**Art Unit**	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 October 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-3,5-20,22-31,33-42,47,48 and 50-52 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-31,33-42,47,48 and 50-52 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 May 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 20051027.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment received on October 27, 2005 has been entered into the record.

Drawings

2. The Drawings filed on May 22, 2001 have been accepted by the Examiner.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on October 27, 2005 is being considered by the examiner.

Claim Objections

4. **Claim 47** is objected to for the following: claim 47 depends from a limitation, pi-conjugated polymers, within claim 3 rather than "the material of claim 3." Correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. **Claims 47 and 48** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As for **claim 47**, the phrase "applied to any of claims" is indefinite, for it is unclear as to how the pi-conjugated polymers would be applied to the claims. **Claim 48** is rejected for being dependent upon a rejected base claim.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. **Claims 1, 3, 7, 12-15, 18, 24-26, 29, 35-39, 42, 47, 48, 51, 52** are rejected under 35 U.S.C. 102(e) as being anticipated by **Bardash (6,278,117)—cited by applicant.**

As for **claims, 1, 3, 7,** Bardash discloses in a solid state radiation detector a material comprising a solid organic semiconducting material consisting essentially of a pi-conjugated material having long chains of alternating single and double carbon-carbon bonds, polythiophene (Fig. 1: 7; col. 4, lines 50-55). As for the specific resistivity, Bardash does not explicitly disclose this, but it is well-known that polythiophene has an electrical resistivity of at least 1 gigaohm-cm as disclosed by applicant (lines 4-7 of page 6 of applicant's disclosure).

As for **claims 12-15, 18,** Bardash discloses in a device for detecting ionizing radiation: electrodes, wherein said electrodes are compositionally alike metals (col. 3, lines 40-45; col. 4, lines 30-35); a solid organic semiconducting material consisting essentially of a pi-conjugated material disposed between said electrodes through embedding into active polymeric layer of polythiophene (col. 3, lines 45-50; Fig. 1: 7; col. 4, lines 50-55); power supply means for providing power to said electrodes, wherein said electrodes are disposed on the surface of the solid organic semiconducting material as a single layer (Fig. 1: 3, 7; Fig. 3: 29). As for the

specific resistivity, Bardash does not explicitly disclose this, but it is well-known that polythiophene has an electrical resistivity of at least 1 gigaohm-cm as disclosed by applicant (lines 4-7 of page 6 of applicant's disclosure).

As for **claims 24-26, 29,** Bardash discloses everything as above (see **claim 1**). In addition, he discloses electrodes are compositionally alike metals (col. 3, lines 40-45; col. 4, lines 30-35); the material of **claim 1** disposed between said electrodes through embedding into active polymeric layer of polythiophene, pi-conjugated polymer (col. 3, lines 45-50; Fig. 1: 7; col. 4, lines 50-55); power supply means for providing power to said electrodes, wherein said electrodes are disposed on the surface of the solid organic semiconducting material as a single layer (Fig. 1: 3, 7; Fig. 3: 29).

As for **claims 35 and 36,** Bardash discloses the material of **claim 1** (see **claim 1** above). In addition, he discloses an array of wires embedded in the material of claim 1 (Fig. 2; col. 3, lines 45-50); the array comprising a first set of parallel wires intersecting orthogonally with a second set of parallel wires (Fig. 3: 19, 21, 15 , 17); means for supplying power to each array (Fig. 3: 29).; with wires spaced at a distance of from 10 microns to 100 microns apart (col. 3, lines 64-65).

As for **claims 37-38**, Bardash discloses the material of **claim 1** (see **claim 1** above). In addition, he discloses a plurality of layers joined together to form a multilayer stack, wherein each layer comprises an array of wires embedded in the material of claim 1 (Fig. 2; col. 3, lines 45-50); the array comprising a first set of parallel wires intersecting orthogonally with a second set of parallel wires (Fig. 3: 19, 21, 15 , 17); means for supplying power to each array (Fig. 3:

29).; with wires spaced at a distance of from 10 microns to 100 microns apart (col. 3, lines 64-65).

As for **claim 39**, Bardash discloses: electrodes (Fig. 2: 3); a pi-conjugated polymer, polythiophene, disposed between said electrodes (col. 3, lines 45-50; Fig. 1: 7; col. 4, lines 50-55), wherein said pi-conjugated polymer has C:H ratio and density substantially equal to that of human skin (col. 4, lines 62-68; col. 5, lines 1-5); wherein said electrodes are disposed on the surface of the pi-conjugated polymer as a single layer (Fig. 2: 3; Fig. 1: 3, 7). As for the specific resistivity, Bardash does not explicitly disclose this, but it is well-known that polythiophene has an electrical resistivity of at least 1 gigaohm-cm as disclosed by applicant (lines 4-7 of page 6 of applicant's disclosure).

As for **claim 42**, Bardash discloses: providing a device comprising a pi-conjugated polymer, polythiophene, disposed between an array of electrodes through embedding (Fig. 1: 3, 7); the electrodes are compositionally alike (col. 3, lines 40-45; col. 4, lines 30-35); applying power to the electrodes to produce an electric field within the pi-conjugated polymer (Fig. 3: 29); exposing the device to ionizing radiation (col. 5, lines 10-15). As for the specific resistivity, Bardash does not explicitly disclose this, but it is well-known that polythiophene has an electrical resistivity of at least 1 gigaohm-cm as disclosed by applicant (lines 4-7 of page 6 of applicant's disclosure).

As for **claims 47-48**, Bardash discloses everything as above (see **claim 3**). In addition, he discloses an external stress, a voltage, is applied to orient the polymer chains at a temperature above glass transition and below melting temperature, the casting temperature for crystalline structure formation (col. 5, lines 1-10).

As for **claims 51 and 52**, Bardash discloses everything as above (see **claim 1**). In addition, he discloses providing an array of wires embedded in the polythiophene layer comprising a first set of parallel spaced apart wires intersecting orthogonally with a second set of parallel spaced apart wires (Figs. 2 and 3: 3, 17, 19, 21, 15); supplying electric power to the array (Fig. 3: 29); inserting the array into a radiation field and detecting the signal generated when radiation strikes the wires (col. 5, lines 10-20); wherein the array is a multilayer array (Fig. 2: 3; Fig. 1: 3, 5, 7).

9. **Claims 1-3, 7, 8, and 9** are rejected under 35 U.S.C. 102(b) as being anticipated by **Snavely (3,849,345).**

As for **claims 1-3, 7, 8, 9,** Snavely in conductive articles discloses a solid semiconductive material (col. 1, line 20) consisting essentially of a pi-conjugated material having an electrical resistivity of at least 1 gigaohm-cm, a composition of styrene, butadiene, and polystyrene; wherein the material has long chains of alternating single and double carbon-carbon bonds, butadiene-styrene copolymer mixed with organic polymers, block polystyrene (table 1; table 2; col. 4, lines 15-40).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. **Claims 2, 8, 9, 19, 20, 30, 31,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bardash (6,278,117)—cited by applicant** in view of **Butler et al. (4,641,037)** further in view of **Selph (4,445,036)** and **Snavely (3,849,345).**

As for **claims 2, 8, 9, 19, 20, 30 and 31** Bardash discloses everything as above (see **claims 1, 3, 15, and 26**). He is silent concerning a mixture of pi-conjugated materials or mixing with organic polymers; however, Butler in an organic metal neutron detector teaches that any organic material with a high resistivity can be used for radiation detection (col. 3, lines 15-20) and that polythiophene and polypyrrole are functional equivalents (col. 3, lines 65-67; col. 4, lines 1-3); wherein, due to the properties of the organic film used both neutron radiation and ionizing radiation may be detected (col. 3, lines 30-42). As well Selph teaches that a polypyrrole detector is used for both neutron radiation detection and dosimetry (col. 4, lines 50-65). And Snavely teaches a mixture, a composition of styrene, butadiene, and polystyrene; wherein the material has long chains of alternating single and double carbon-carbon bonds, butadiene-styrene copolymer mixed with organic polymers, block polystyrene with high resistivity (table 1; table 2; col. 4, lines 15-40). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the material comprise a butadiene-styrene copolymer mixed with a block polystyrene in order to provide a high resistivity for maximum sensitivity in neutron detection/dosimetry.

In addition, applicant discloses the equivalence of polythiophene with combinations of pi-conjugated polymers as stated in the Markush group claim 5 as originally filed by applicant and therefore shows that a mixture of pi-conjugate materials or mixture of pi-conjugated polymers is an equivalent structure known in the art. Therefore, because these two were art-

recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute polythiophene for a mixture of pi-conjugated materials or a mixture of pi-conjugated polymers.

12. **Claims 5, 6, 16, 17, 27, 28,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bardash (6,278,117)—cited by applicant** in view of **Butler et al. (4,641,037)** further in view of **Selph (4,445,036).**

As for **claims 5, 6, 16, 17, 27, 28,** Bardash discloses everything as above (see **claims 3, 15, and 26**). However, he is silent concerning polypyrroles and/or polyacetylenes. However, Butler in an organic metal neutron detector teaches that any organic material with a high resistivity can be used for radiation detection (col. 3, lines 15-20) and that polythiophene and polypyrrole are functional equivalents (col. 3, lines 65-67; col. 4, lines 1-3); wherein, due to the properties of the organic film used both neutron radiation and ionizing radiation may be detected (col. 3, lines 30-42). As well Selph teaches that a polypyrrole detector is used for both neutron radiation detection and dosimetry and that polyacetylenes and polypyrroles are functional equivalents (col. 4, lines 50-65). Therefore, because polythiophene, polypyrroles, and polyacetylenes were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute polythiophene for polypyrrole or polyacetylene.

In addition, applicant discloses the equivalence of polythiophene with polyacetylenes and polypyrroles as stated in the Markush group claim 5 as originally filed by applicant. Therefore, because polythiophene, polypyrroles, and polyacetylenes were art-recognized equivalents at the

time the invention was made, one of ordinary skill in the art would have found it obvious to substitute polythiophene for polypyrrole or polyacetylene.

13. **Claims 10, 22, 33, and 41,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bardash (6,278,117)—cited by applicant** in view of **Butler et al. (4,641,037).**

As for **claims 10, 22, 33**, Bardash discloses everything as above (see **claims 3, 15, and 26**). He is silent concerning a metal incorporated into the pi-conjugated material. However, Butler in an organic metal neutron detector teaches incorporating boron into the structure in order to provide a good response to slow neutrons (col. 5, lines 40-50) and that thiophene detectors may be used as gamma ray and neutron radiation detectors (col. 3, lines 30-40 and line 65-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate boron into the pi-conjugated material in order to improve detector response to slow neutrons.

As for **claim 41**, Bardash discloses: providing a device comprising a pi-conjugated polymer, polythiophene, disposed between an array of electrodes through embedding (Fig. 1: 3, 7); the electrodes are compositionally alike (col. 3, lines 40-45; col. 4, lines 30-35); applying power to the electrodes to produce an electric field within the pi-conjugated polymer (Fig. 3: 29); exposing the device to ionizing radiation (col. 5, lines 10-15). As for the specific resistivity, Bardash does not explicitly disclose this, but it is well-known that polythiophene has an electrical resistivity of at least 1 gigaohm-cm as disclosed by applicant (lines 4-7 of page 6 of applicant's disclosure). As for exposing the device to neutron radiation, Bardash is silent. However, that thiophene detectors may be used as gamma ray and neutron radiation detectors (col. 3, lines 30-40 and line 65-67). Therefore, it would be obvious to one of ordinary skill in

the art at the time the invention was that the device would be exposed to neutron radiation, for the device detects ionizing radiation as well as neutron radiation.

14. **Claims 11, 23, and 34,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bardash (6,278,117)—cited by applicant** in view of **Butler et al. (4,641,037)** further in view of **Smith et al. (3,824,220).**

As for claims 11, 23, and 34, Bardash in view of Butler discloses everything as above (see claims 10, 22, and 33). In addition, boron is incorporated in the form of BF_4- (Butler: col. 5, line 45). Butler does not mention a boronic acid. However, Smith teaches that BF_4- termination in a polymers from a strong acid (col. 1, lines 10-20; col. 5, lines 1-5). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a boronic acid was used to incorporate BF_4- into the pi-conjugated material for a strong Lewis acid, BF_3, is used to react with polymers to form the anion.

15. **Claim 40** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hodges et al. (6,174,420)** in view of **Heffelfinger (3,048,564).**

As for **claim 40**, Hodges in an electrochemical cell discloses the following: a pair of electrodes, each having a length and width, wherein the length is greater than the width (Fig. 15: 13); a solid organic semiconductor material, π-conjugated polymer, PET layer, between said electrodes (Fig. 15: 1); wherein the combination of electrodes and a π-conjugated polymer, PET layer, is rolled up along their length to form a cylindrical-shape structure having a small volume relative to the surface area (Fig. 15; col. 4, lines 30-35); means for providing power to said electrodes (col. 4, lines 44-47). As for the particular electrical resistivity for the PET, Heffelfinger is silent. However, Heffelfinger teaches in preparing PET that PET has a resistivity

above a gigaohm-cm (Table 1). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that PET had a resistivity above a gigaohm-cm in order to provide effective insulation to the electrochemical cell.

16. **Claim 50** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Bardash (6,278,117)—cited by applicant** in view of **Robinson et al. (5,500,534).**

As for **claim 50**, Bardash discloses everything as above (see **claim 1**). In addition, he discloses the following: electrodes, wherein electrodes have prefabricated pulse detection circuitry patterned thereon (col. 3, lines 40-45; col. 4, lines 20-40); the material of claim 1 disposed between the electrodes (Fig. 1: 3, 7); power supply means for providing power to said electrodes (Fig. 3: 29). However, he is silent concerning the electrodes are composed of silicon wafers; Bardash does disclose the circuitry patterned on a polyimide layer (col. 4, lines 14-16). However, Robinson in a radiation detection system teaches that polyimide layers are disposed on silicon wafers (col. 13, lines 20-30). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the electrodes were composed of silicon wafers in order to support the polyimide layer during the microelectronic devices fabrication.

Response to Arguments

17. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. As for the allowable subject matter set forth in the previous action, the Examiner apologizes for the inconvenience but upon further search a rejection to the claims comprising the allowable subject matter set forth in the previous action has been made.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(571) 273-8300**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
January 20, 2006

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23 JAN 06